

WELL SUMMARY

page 1 of 4Location ID: BLM-2-630 Field Representative(s): Egan/Kaszuba/CooperNorthing: 225701.70 Easting: 402993.49Date Started: 12 May 1988 Date Completed: 13 June 1988Drilling Method: Air-foam rotary Drilling Contractor: LarjonDriller: J. GowerTotal Depth Borehole: 670' Total Depth Well Casing: 645.12'Total Depth Surface Casing: 95'Diameter Well Casing: 4" Diameter Surface Casing: 10"Length of Bottom Blank: 5.27' (with bottom cap)Type of Screen: extra strength 0.02 slotScreen Interval: 629.49' to 639.85'Water First Detected: 460-500' Water Level Open Borehole: 463' (geophysical log)Water Level Cased Borehole: 464.2 (measured by GCL from ground level)

Quik-Foam Use: 10 gallons foam and 5 gallons EZ-Mud

Estimated Water Use: 13,050 gallons used during drilling
42,539 gallons recirculated (includes formation water
blown from borehole)

Well Casing:

4in x 3ft SCD 40 PVC:	stock SS centralizers:
4in x 5ft SCD 40 PVC:	custom SS centralizers: 2
4in x 10ft SCD 40 PVC:	4"x2' SS locking riser: 1
4in x 20ft SCD 40 PVC:	4" SS locking cap: 1
Total SCD 40 PVC pipe: ft	4" SS female cap: 1
4in x 3ft SCD 5 SS pipe: 2	
4in x 5ft SCD 5 SS pipe:	4in x 5ft SCD 10 SS pipe: 2
4in x 10ft SCD 5 SS pipe:	4in x 10ft SCD 10 SS pipe:
4in x 20ft SCD 5 SS pipe: 20	4in x 20ft SCD 10 SS pipe: 11
Total SCD 5 SS pipe: 406 ft	Total SCD 10 SS pipe: 230 ft

Well Completion:

100# bags 16/40 sand: 4 bags
100# bags 10/20 sand: 41 bags
100# bags 8/14 sand: 1 bags
100# bags 8/20 sand: 40 bags

94# bags cement: 210 bags

5 gal. buckets bentonite: 6 buckets (1/4" pellets)

50# bentonite powder: 20 bags

Benseal 1 bags

Surface Casing:

94# bags cement: 100 bags

50# bags bentonite powder: 10 bags

Pertinent Field Notes:

5/12/88 Drill BLM-2-Deep pilot hole, 8 3/4" bit. Drilled to 85'. Drilling is very slow. Used 1800 gallons water.
5/13/88 Finished 8 3/4" pilot hole to 105'. Ream hole with 14 3/4" bit to 80'. Used 2300 gallons water.
5/14/88 Finish reaming with 14 3/4" bit to 100'. Install 95' x 10 3/4" steel surface casing and grout. Had trouble installing surface casing past 95'. Used 600 gallons water.
5/15/88 Drilling, 9 7/8" bit from 105' to 347'. Monitored both main (2 L/min for 1 hour) and auxiliary (171'-217', 2 L/min for 1 hour) compressors while drilling the vadose zone. Results from filter tests are negative for hydrocarbons. Used 3000 gallons water.
5/16/88 Drilling, 9 7/8" bit from 347' to 450'. Monitored main compressor (383'-403', 2 L/min, 1 hour) and auxiliary compressor (408'-445', 2 L/min, 1 hour). Results from filter tests are negative for hydrocarbons. Used 1450 gallons water.
5/17/88 Move 1100 gallon stock tank to well site for use in developing.
5/26/88 Drilling, 9 7/8" bit from 447'-550'. Water detected between 460' and 500'. Monitored both main (447'-507', 2 L/min for 1 hour) and auxiliary (507'-545', 2 L/min for 1 hour) compressors. Results from filter tests negative for hydrocarbons. Cored from 550'-560'. No recovery. Used 1400 gallons water.

- 5/27/88 Drilling, 9 7/8" bit from 550'-670'. TD'd hole 15' into bedrock. Monitored auxiliary compressor (597'-660', 2 L/min for 1 hour). Test results negative for hydrocarbons. Rubber seal ruptured on head block. Repaired at well site. 1100 gallons water used.
- 5/28/88 BLM-2-630 logged by D. Pearson of Southwest Surveys. Standard suite plus drift. Screened interval chosen at 630'-640'. Installed bottom plug by using chilled pellets (stored in refrigerator then brought to the field in coolers packed with ice). Chilling pellets helps to retard the hydration, allowing more time for installation in a large water column. This method worked very well.
- 5/29/88 Installed 4" x 648' SS casing. Set top of screen at 429.49', 2.9' of stick up. Experimented with a 2-tremie method for completion; 1 1/4" for sounding and 1" for installing sand and bentonite. Install gravel pack. Bridge between 541' and 618' during installation, shake tremie to loosen.
- 5/30/88 Surged 2" x 10' bailer in screened interval to settle gravel pack. 3 1/2" x 18' bailer would not run past 580' because of the drift in the hole. Attempted to install top plug and bentonite. Clogged the 441' of 1" tremie. Tripped out tremie, banged bentonite out of pipe. Abandoned the "2-tremie" idea because crowded conditions in the borehole increased the occurrence of bridging. Pour 1/4" chilled bentonite pellets down 1 1/4" tremie. Pellets clog in tremie. Pull out tremie and bang out pellets.
- 5/31/88 Experiment with washing pellets down tremie. Set up a "Y" connector on top of tremie. A water source is connected to one port and run at ~ 5 gallons/minute. Bentonite pellets are fed into the second port. This method succeeded in washing the pellets down and out the tremie but only ~ 10% made it to the bottom (confirmed by sounding). Pellets are adhering to the side of the bore where hole is drifting. Will try to pump Benseal plug.
- 6/1/88 Experimented with pumping a Benseal plug. Mixed 1/2 bag Benseal to 25 gallons water with 1 pint EZ-Mud. Pump the solution down tremie just above the point where the plug will be located. Pumping is done quickly so Benseal does not set up in tremie. After Benseal is pumped it is followed by a 40 gallon slug of water. Plug pumped successfully. Chased plug with 10/20 sand and sounded. Plug is 8' thick. Since entire tremie was wet, emplaced filler sand above top plug by washing down tremie with water. A few sand clogs occurred in the tremie with this washing method but tripping out 1 to 2 joints and shaking tremie solved the problem. Discovered this method works best with sand hopper fully open.
- 6/2/88 Attempted to pump a second Benseal plug ~ 50' above the first upper plug using same method. Benseal thickened in tremie and clogged. Trip out tremie and steam clean. Decide to install second upper plug at ~ 510'. The purpose of placing a second upper plug much higher is to inhibit any downward migration of contamination.

6/3/88 Added filler sand from 584' to 472', overshooting target of 510'. Sounded one more time and discovered sand had settled 20' to 492'.

6/8/88 Sand settled 3' to 495'. Successfully pumped a 3.8' plug of Benseal. Added filler sand to 10' above static and one truckload of grout.

6/9/88 Removed equipment and cleaned up well site. Prepared for pouring second load of grout and development.

6/10/88 Set submersible pump in well at 556'. Ran out of electrical wire on pump to run deeper. Pumped 1054 gallons at 13 gpm. Conductivity, pH and temperature stabilized but water remained cloudy.

6/11/88 Spliced more wire onto submersible pump and lowered pump to bottom of screen; 640'. Pumped 632 gallons at 11 gpm. Conductivity, pH and temperature remained stable and water cleared considerably. Pumped 1686 gallons total. Well developed. Poured second truckload of grout into well.

6/12/88 Poured concrete pad and set brass cap.